



North Carolina Department of Transportation

Chapter 2 Legal Aspects, Policies and Practices in Highway Drainage

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Revisions Sheet			
Page	Old Section	New Section	Description
-	-	-	<ul style="list-style-type: none">• Entire Chapter revised to new format and minor grammatical changes made throughout• All references and links have been updated throughout Chapter
4	2.2.5.4	2.2.5.4	4 th paragraph revised
6	2.3.4	2.3.4	Last sentence revised; Removed reference to Appendix O
7	2.3.6	2.3.6	Removed extra text from bottom of section
8	-	2.3.9	Added new section – Executive Order 80
9	-	2.4.1.1	Added new section – Discharge vs. Conveyance
12	-	2.4.5.1	Added new section – Obstructed Outlets Protocol
13	2.4.7	2.4.7	4 th paragraph revised
16	2.4.12	2.4.12	3 rd bullet revised
16	-	2.4.13	Added new section – Emergency Replacement of Drainage Structures
18	-	2.5	Added new section - References
21	-	2.6	Added new section – Additional Documentation



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2.1 Introduction

This chapter has two purposes:

1. Summarize the relevant Federal and State laws which govern NCDOT highway drainage design
2. Discuss general NCDOT policies and practices pertinent to typical highway drainage designs

2.2 Federal Laws

2.2.1 Clean Water Act

In 1977, Congress amended the Federal Water Pollution Control Act (FWPCA) to regulate the discharge of pollution into U.S. waters, which was officially designated the *Clean Water Act*, 33 USC 1344 (CWA) (U.S. Code, 2011). It serves as the cornerstone of federal law for all water quality programs. It directs the Environmental Protection Agency (EPA) and other regulatory agencies to establish standards of water quality for states to follow.

Section 401 of the CWA states that no Federal permit or license can be issued that may result in a discharge to waters of the United States, unless the State certifies that the discharge is consistent with standards and other water quality goals or waives certification.

Section 404 of the CWA prohibits the unauthorized discharge of dredged or fill material into waters of the United States, including navigable waters. Such discharges require a permit. The United States Army Corps of Engineers (USACE) has granted Nationwide General Permits for several categories of certain minor activities involving discharge of fill material. Under the provisions of 33 CFR 330.5(a) (NCDOT, 2021), fill associated with construction of bridges across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, temporary construction, and access fills, are authorized under the Nationwide Section 404 Permit. Section 404 also requires any federal permit applicant to obtain a Section 401 water quality certification from the appropriate state regulatory agency if the proposed activity may affect the quality of waters of the United States (AASHTO, 2014).

2.2.2 National Pollutant Discharge Elimination System

In 1987, Congress passed an amendment to the Clean Water Act to add stormwater permits to the National Pollutant Discharge Elimination System (NPDES) program under Section 402. Section 319, which addresses nonpoint source pollution, requires each state to better integrate the Coastal Nonpoint Program and the Statewide Nonpoint Program. In 1997, the NC Legislature passed House Bill 515, which initiated development of a statewide stormwater permit under the NPDES.



On June 9, 1998, NCDOT was the first statewide agency in the nation to be issued an individual statewide transportation NPDES Stormwater Permit (NCS000250) by the EPA through the NC Department of Environment and Natural Resources (DENR), which is now the NC Department of Environmental Quality (DEQ). This permit is jointly managed by the Hydraulics and Roadside Environmental Units. Requirements contained in the permit address a broad range of NCDOT activities, including the following programs:

- Illicit Discharge Detection and Elimination
- Stormwater System Inventory and Prioritization
- Best Management Practices (BMP) Retrofit
- BMP Toolbox for Post-Construction Runoff
- BMP Inspection and Maintenance
- Post-Construction Runoff Control
- Vegetation Management
- Construction
- Industrial Activities
- Education and Involvement
- Research
- Total Maximum Daily Load (TMDL)

For more details, see also [Chapter 13](#).

2.2.3 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321–4347), Section 102, requires that all federal agencies ensure that environmental amenities and value be given appropriate consideration in decision making, along with economic and technical considerations (AASHTO, 2007).

NCDOT must comply with Federal Highway Administration (FHWA) regulations for all Federal aid projects, which are tailored for linear transportation projects and are consistent with NEPA implementation. NCDOT signed an Interagency Agreement in 1977 with the FHWA and the U.S. Army Corps of Engineers (USACE) to integrate Section 404 permit requirements with the NEPA process, constituting the original merger process for transportation projects in North Carolina (NCDOT, 2021). This process was recently modified in a 2012 Memorandum of Understanding and streamlines the project development and permitting processes (NCDOT, 2012). More information on the Merger Process is provided in [Chapter 3](#), Section 3.3.

FHWA guidance on NEPA implementation is provided at <https://www.environment.fhwa.dot.gov/projdev/pd2implement.asp>.



2.2.4 Executive Order 13653

Executive Order 13653, issued November 1, 2013, requires Federal agencies to prepare the nation for the impacts of climate change by promoting:

- engaged and strong partnerships and information sharing at all levels of government
- risk-informed decision making
- adaptive learning
- preparedness planning

FHWA subsequently issued Order 5520 on December 15, 2014, to establish policy on preparedness and resilience to climate change and extreme weather events. In this directive, climate change refers to any significant change in the measures of climate, such as temperature, precipitation, wind patterns, etc. lasting for an extended period. Changes in climate may manifest as a rise in sea level, as well as increase the frequency and magnitude of extreme weather events (Federal Register, 2013).

2.2.5 National Flood Insurance Program

The National Flood Insurance Act of 1968 (FEMA, 1997) established the National Flood Insurance Program (NFIP), which could impose restrictions on the construction of highways in floodplains and floodways in communities that have qualified for flood insurance. It is possible to comply with the Federal requirements regarding the encroachment of a highway on a floodplain and still be faced with future legal liabilities due to the impact of the highway on the floodplain and the stream (AASHTO, 2007). Hydraulics engineers should review the potential for these future liabilities to ensure that they are properly addressed in the development of the proposed hydraulic design.

Regulations pertaining to Federal flood insurance are contained in 44 CFR 59-80, National Flood Insurance Policy (FEMA, 2016).

See [Chapter 15](#) for information on floodplain management.

2.2.5.1 Executive Order 11988

This Order was issued in 1977 and requires Federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative (U.S Water Resources Council, 1978), (Federal Register, 1977).

2.2.5.2 Executive Order 13690

Executive Order 13690 was issued on January 30, 2005 and amends Executive Order 11988. This order establishes a Federal Flood Risk Management Standard as a flexible framework to increase resilience against flooding and helps preserve the natural value of floodplains as part of a national policy on resilience and risk reduction consistent with



President Barack Obama's *Climate Action Plan* (Federal Register, 2015), (Obama, 2013).

2.2.5.3 Guidance from FHWA

In June 1982, the Federal Highway Administration (FHWA) and the Federal Emergency Management Agency (FEMA) established a Memorandum of Understanding regarding a procedural document entitled, "Procedures for Coordinating Highway Encroachments on Floodplains with the Federal Emergency Management Agency". This has been formally issued in non-regulatory Supplements 1-3 for Part 650, Subpart A of Title 23 CFR in the Federal Aid Policy Guide (FAPG) (FHWA, 1969).

These supplements discuss recommendations regarding state agencies and municipalities' responsibility for:

- proposed storm drain installations
- design standards for floodplain encroachments
- coordinating proposed highway encroachments on floodplains with FEMA to ensure regulatory compliance

Federal Aid projects must comply with FHWA regulations or orders, while being consistent with FEMA requirements (including Executive Orders). FHWA regulation applies to all Federal Aid actions in a base floodplain, not just FEMA-regulated floodplains. Detailed guidance on FEMA National Flood Insurance Program compliance as it pertains to specific NCDOT drainage practices is provided in [Chapter 15](#) (FHWA, 1992).

2.2.5.4 FEMA Hazard Mitigation Grant Program Properties Impacts

Another important area of concern is the impact on Hazard Mitigation Grant Program (HMGP) properties (e.g., FEMA buyout properties), which may exist pursuant to acquisition under authorization of Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c.

The Stafford Act requires that such property acquisitions comply with 44 CFR Part 80 FEMA Property Acquisition and Relocation for Open Space. As such, ownership of the acquired property is transferred to the local community government or eligible conservation organization to be maintained for open space purposes in perpetuity to restore and/or conserve the natural floodplain functions. Deed restrictions are placed on the property which prohibit:

- adding any new pavement for roads, highways, bridges, and paved parking areas (including asphalt, concrete, oil-treated soil, or other material that inhibits floodplain functions)
- Placing fill, except where necessary to avoid affecting onsite archeological resources



Reuse of existing paved surfaces for recreational uses on the acquired property consistent with allowable uses is generally acceptable.

HMGP properties must be identified early in the planning stage so every effort can be made to avoid impacts while developing design alternatives for consideration for a given highway project. Identifying HMGP properties, and determining the applicable restrictions associated with them, should be coordinated through the NC Department of Public Safety, Division of Emergency Management, Hazard Mitigation Section.

Further details regarding HMGP properties are discussed in the FEMA publication *Hazard Mitigation Assistance Guidance; Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program* (February 27, 2015) (FEMA, 2015).

2.3 State Laws and Programs

2.3.1 State Environmental Policy Act

The State Environmental Policy Act of 1971 (SEPA) [G.S. 113A, Article 1] requires State agencies to review and report on a proposed project's environmental effect in the form of either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) document unless the project is covered by minimum criteria. These documents are meant to disclose the direct, secondary, cumulative, long-range, and short-term impacts of the proposed project. An EA is prepared if the:

- project is not anticipated to produce significant adverse environmental impacts
- impacts can be mitigated to a non-significant level
- magnitude of impacts is uncertain

An EIS should be prepared if the project's impacts will be significant or not able to be fully mitigated. An EIS will provide a more extensive evaluation of the advantages and disadvantages of project alternatives and is written in greater detail than an EA (NCDEQ, n.d.).

2.3.2 Coastal Area Management Act

In 1974, the General Assembly passed the Coastal Area Management Act (CAMA) [G.S. 113A, Article 7] to balance economic development and environmental protection in North Carolina's 20 coastal counties. These counties are subject to the rules and policies of the Coastal Resources Commission (CRC), which administers CAMA regulatory compliance. The Division of Coastal Management (DCM), a division of NCDEQ (formerly NCDENR), serves as CRC staff and works to protect, conserve, and manage North Carolina's coastal resources through an integrated program of planning, permitting, education and research pursuant to CRC rules and policies.



Areas of Environmental Concern (AEC) are the foundation of the CRC's permitting program for coastal development. An AEC:

- is an area of natural importance
- may be easily destroyed by erosion or flooding
- may have environmental, social, economic, or aesthetic values that make it valuable to our state (NCDEQ, 2021)

The CRC classifies areas as AECs to protect them from uncontrolled development, which may cause irreversible damage to property, public health, or the environment. AECs cover almost all coastal waters and about three percent of the land in the 20 coastal counties.

The CRC has established four categories of AECs:

- Estuarine and Ocean System
- Ocean Hazard System
- Public Water Supplies
- Natural and Cultural Resource Areas

2.3.3 NC Water Supply Watershed Protection Act

In 1989, State Legislature (G.S. 143-214.5) passed the Water Supply Watershed Protection Act to protect drinking water supplies. The Act directed the Environmental Management Commission (EMC) to adopt minimum statewide water supply protection standards and implement water quality protection programs (NCDEQ, 2021). It also required classification of State's waters, based on their quality and significance to the municipalities (NCDEQ, 2021).

2.3.4 Stormwater Management Rules

State Highway (NCDOT) development projects are permit-based, with each individual project evaluated on a case by case, which are covered under 15A NCAC 02H .1003, subparagraph (d)(3)(C) "Other Projects". The rule states: *"otherwise meets the provisions of this Section and has water dependent structures, public roads and public bridges which minimize built-upon surfaces, divert stormwater away from surface waters as much as possible and employ other best management practices to minimize water quality impacts."* Notable among these are the criteria that have been established for determining locations where BMP must be provided to protect critical water supply watershed areas.

NCDOT is regulated under a separate NPDES Stormwater Permit (see 2.2.2), which covers all NCDOT activities statewide.



2.3.5 Riparian Buffer Rules

Beginning in 1999, EMC adopted Riparian Buffer Rules (G.S. 143-214.20-26; 15A NCAC 02B) to protect existing riparian buffers on nutrient sensitive waters (NSW) and certain water supply watersheds (NCDEQ, 2021).

See [Chapter 13 Stormwater Management](#) for additional information.

2.3.6 State Sedimentation Pollution Control Act

The State Sedimentation Pollution Control Act was adopted in 1973. This promulgated rules and regulations to control accelerated erosion and sedimentation resulting from land-disturbing activities. The Department of Transportation has the authority to administer an erosion and sedimentation control program within the Department. NCDOT's Roadside Environmental Unit is primarily responsible for development of the erosion and sedimentation control plans for state highway projects.

Guidance regarding culvert construction phasing considerations with respect to hydraulic design is provided in [Chapter 12](#).

2.3.7 State Floodplain Management Policy

In 1990, Governor James G. Martin issued State Executive Order 123, which requires all State agencies to follow a uniform floodplain management policy and providing guidance for compliance with Federal regulations (Martin, 1990).

Section 3 of the Executive Order states:

The Department of Administration shall administer a Uniform Floodplain Management Policy for state agencies. By agreement between the Department of Transportation and the Department of Administration, the Department of Transportation shall work directly with the Federal Department of Transportation and the Federal Emergency Management Agency to apply appropriate standards and management to comply with the Floodplain Management Policy relevant to highway construction within floodplains.

This Executive Order provides the legal basis for NCDOT to enter into a Memorandum of Agreement with the NC Floodplain Mapping Program, as discussed in [Chapter 15](#) (NCDOT, 2008 and as amended).

2.3.8 Reasonable Use Rule

Prior to the adoption of the Reasonable Use Rule, North Carolina adhered to the civil law rule regarding surface water drainage. This civil law rule obligated owners of lower land to receive the natural flow of surface water from higher lands and subjected a landowner to liability whenever he or she interfered with the natural flow of surface waters to the detriment of another in the use and enjoyment of his or her land. Since almost any use of land involves some change in drainage and water flow, a strict



application of the civil law principles was not practical. As such, a more moderate application of this rule to allow a landowner reasonable use of his or her property evolved.

In 1977, the North Carolina Supreme Court formally adopted the Rule of Reasonable Use with respect to surface water drainage, which abandoned the Civil Law Rule (Pendergrast v. Aiken, 236 S.E.2d 787, 293 N.C. 201). The adopted Reasonable Use Rule allows each landowner to make reasonable use of his or her land even if by doing so, he or she alters in some way the flow of surface water thereby harming other landowners, with liability being incurred only when this harmful interference is found to be unreasonable and causing substantial damage.

There are still some unanswered questions in the application of the adopted Reasonable Use Rule to specific areas of state agency activities. However, this rule is more compatible with and adaptable to the realities of modern life and will provide just, fair, and consistent treatment. As such, NCDOT general drainage policies and practices follow this rule.

The Reasonable Use Rule places responsibility on the landowner to make reasonable use of his or her land. While reasonable use is open for interpretation on a case-by-case basis, the implication for highway drainage is that provisions for, and treatments of, surface waters on properties are to be made in accordance with sound, reasonable, and acceptable engineering practices. Therefore, engineers should evaluate the potential effects of surface water activities on both upstream and downstream properties and to include provisions in their design to hold these effects to reasonable levels.

2.3.9 Executive Order 80

In October 2018, Governor Cooper issued executive Order 80: North Carolina's Commitment to address Climate Change and Transition to a Clean Energy Economy. Among other things, it directed Cabinet agencies to "evaluate the impacts of climate change on their programs and operations and integrate climate change mitigation and adaptation policies into their programs and operations." (Section 2, (Cooper, 2018))

Climate change mitigation and adaptation policies for drainage studies can be found in [Chapter 6: Resilience](#).

2.4 General Drainage Policies and Practices

2.4.1 Augmentation or Acceleration of Peak Rate of Flow

Development of property can cause an increase in the quantity and peak rate of flow by increasing impervious areas and providing more hydraulically efficient channels and overland flow. It is NCDOT policy to develop and make reasonable use of its lands and rights-of-way through sound, reasonable and acceptable engineering practices and to



deny responsibility for effects of augmented or accelerated flow caused by its improvements unless determined to cause unreasonable and substantial damages. Likewise, it is NCDOT policy to expect the same practice and acceptance of responsibility of owners and developers of properties adjacent to state highways.

2.4.1.1 Discharge vs. Conveyance

Discharge is the release of stormwater that has accumulated on NCDOT right-of-way to areas outside of the right-of-way. Conveyance is the transfer of stormwater or floodwaters across, or through, the NCDOT right-of-way that originate outside of NCDOT right-of-way. It is the policy of NCDOT to discharge stormwater from its facilities in a manner that does not violate water quality standards or erosion control standards per the NPDES permit, and to convey stormwater and floodwaters in a manner that does not violate the reasonable use rule and any other applicable laws and rules, such as the National Flood Insurance Program (Reference [Chapters 13](#) and [15](#)).

NCDOT reserves the right to alter or remove discharge or conveyance structures within its rights-of-way and accepts no liability for such action when following applicable laws, rules, and standards.

2.4.2 Diversions

Diversions are defined as the act of altering the path of surface waters from one drainage outlet to another. NCDOT's policy is to design and maintain its road systems, so that no diversions are created thereby. Anyone desiring to create a diversion into any highway rights-of-way shall not be allowed to do so unless written permission is obtained from the State Hydraulics Engineer. Permission will be granted only after it has been determined that:

- the additional flow can be properly accommodated without causing damage to the highway
- the cost for any required adjustments to the highway system will be borne by the requester
- appropriate consideration and measures have been taken to indemnify and hold NCDOT harmless from potential downstream damage claims

It is NCDOT policy not to become a party to diversions unless refusal would create a considerable and real hardship to the requesting party.

2.4.3 Improvements and Maintenance of Drainage within the Right-of-Way

Drainage structures and ditches shall be maintained such that they do not present an unreasonable level of damage potential for the highway or adjacent properties.



Where the elevation of the flow line of an existing culvert under a highway is not low enough to adequately provide for natural drainage, NCDOT will assume full responsibility for lowering the culvert or otherwise providing needed improvement.

Where a requested culvert invert adjustment is a result of a property owner lowering the flow line of the inlet and outlet ditch to improve drainage of his or her property, the following considerations shall be given to the action taken:

- The lowered culvert must have a reasonable expectancy of being functional and maintainable;
- NCDOT participation (up to full cost) must be based on benefit gained by the roadway drainage system because of the lowering;
- Where the new installation is of doubtful, or no benefit to highway drainage, the requesting party must bear the entire cost of installation.

It is NCDOT's responsibility to replace the structure or otherwise take appropriate action wherever the size of an existing highway culvert is inadequate because of a general overall development of the watershed.

When a culvert's inadequacy is the result of a single action or development, it is considered "unreasonable and substantially damaging" under the state's adopted drainage ruling (see 2.3.8). The party responsible for the action or development should bear the cost of replacement.

When a new culvert crossing is requested, and if the culvert is required for proper highway drainage or sufficient benefits to the highway drainage system would occur, NCDOT will bear the full cost, providing there is no diversion of flow involved. When the new installation is of doubtful or no benefit to highway drainage, the property owner will bear the entire cost. When both parties receive benefit, a joint effort may be negotiated.

Established culvert crossings will be maintained. Requests to eliminate any culvert will require approval of the State Hydraulics Engineer.

When new private drives for single-family residential property are constructed entering the highway, the property owner can furnish and deliver to the site, the amount, type, and size pipe designated by NCDOT, to be installed by maintenance forces.

This is not applicable for commercial property. For additional guidance on this matter, refer to NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (NCDOT, 2003).

No alteration, attachment, extension, nor addition of appurtenance to any culvert shall be allowed on highway rights-of-way without written permission from the State Hydraulics Engineer.

HEC-RAS models analyze one-dimensional flow from downstream to upstream and do not account for any flow attenuation (other than a very few exceptions) due to undersized structures.



While new culverts may allow more water to flow downstream during high water events, using engineering hydraulic judgement based on hydraulic analysis, the Department's policy above, as well as being compliant with all federal and state regulations, there should be no adverse impacts on structures or buildings in the immediate downstream vicinity of these culverts.

2.4.4 Improvements and Maintenance of Drainage Outside the Right-of-Way

It is NCDOT's responsibility to provide adequate drainage for constructing and maintaining the State Highway System. It is not its policy nor responsibility to provide improved drainage for the general area traversed by such roads, unless incidental to the drainage of the road or highway itself. Drainage involvement outside the highway rights-of-way is limited to two general areas of justification:

- Sufficient benefit could be gained by such action to warrant the cost. These benefits would be in such areas as reduction in roadway flood frequency or extent, facilitation of maintenance, or a reduction in potential damages.
- Work is required to correct a problem or condition created by some action of NCDOT.

It is not NCDOT's responsibility to eliminate flooding on private property that is not attributable to acts of the agency or its representative.

In general, outlet ditches will be maintained for a sufficient distance downstream to provide adequate drainage for the highway facility. Maintenance should be done on a cooperative basis, with the benefited properties bearing their proportionate share, on large outlets serving considerable areas outside the right-of-way. In general, shares will be based on proportioning of runoff from the areas served by the outlet.

It is not NCDOT's policy to pipe inlet or outlet drains, natural or artificial, outside the right-of-way, which existed as open drains prior to existence of the highway. Where the property owner wishes to enclose an inlet or outlet, NCDOT may install the pipe adjacent to the right-of-way if justified by reason of reduced maintenance, safety, or aesthetics if the pipe is furnished at the site by the property owner.

This does not apply to the development of commercial property.

2.4.5 Obstructions

If a drain is blocked downstream of the highway and detrimental to highway drainage and from natural causes, NCDOT will take necessary measures to remove the blockage or obstruction. Where the blockage is caused by wrongful acts of others, NCDOT will take whatever recourse deemed advisable and necessary to cause the party responsible to remove the blockage. Where a blockage occurs downstream of a



highway, whether natural or artificial, and is of no consequence to NCDOT, NCDOT will remain neutral in causing its removal.

State statute (G. S. 136-92) provides that anyone obstructing any drains along or leading from any public road is guilty of a misdemeanor.

2.4.5.1 Obstructed Outlets Protocol

Protocol for addressing obstructed outlets, pursuant to G.S. 136-92, as discussed in Section 2.4.5:

- Division staff should advise property owner of unacceptable nature of the action. Allow reasonable time (1 to 2 weeks) for removal.
- If no satisfactory action taken, division staff will request review by Hydraulics Unit.
- Upon receiving review report from Hydraulics Unit, division staff will advise the property owner in writing by registered mail to take appropriate action by a specified reasonable deadline, informing the property owner that if satisfactory action is not taken by that date, the matter will be turned over to the Attorney General's office for legal action.
- Where there is roadway flooding or impending danger to the motoring public, NCDOT Maintenance forces may go off right-of-way for removal of the obstruction without the property owner's permission. However, this type of action may result in litigation for illegal entry of private property. In such cases, we would allow for the court to rule whether NCDOT acted in a prudent and responsible manner.
- Division staff will take photographs to illustrate and provide evidence of the potential danger imposed by the obstruction. It is advisable to also have the Sheriff's Deputy present to witness the danger.

2.4.6 Drainage Easements

It is preferred that any structural feature such as a drop inlet, catch basin, or pipe end be contained within a permanent easement. Where runoff is discharged from the right-of-way at a point where there is no natural drain or existing ditch, a permanent drainage easement is required to allow construction of a ditch or channel to convey the discharge to an acceptable natural outlet. Where permanent easements are required, sufficient information will be obtained, so that the limits, grade, and cross section may be determined. The easement shall be of sufficient size to contain the spoil and provide working room for equipment.

When the discharge is into a natural drain or existing ditch and the increase in flow would exceed the capacity or otherwise create a problem, a temporary drainage easement can be obtained to allow enlarging or otherwise improving the drain to a point where the increased discharge will not cause damage.

Where diversion of water is made to a natural drain or existing ditch which could increase the discharge considerably above its capacity, an easement is required to



enlarge and improve the drain to a point where the increased discharge can be released without causing damage.

Where improvement to an existing drain is required for proper drainage and not covered in the paragraph above, a permanent drainage easement is not required. Even though the drain may be enlarged and deepened, if the property owner is informed of what is to be done and agrees in writing to allow entry onto his or her property for this work, it is all that is required. This should not be construed to mean that in all cases of this nature that only a permit of entry should be obtained. There will be instances where a permanent easement is desirable.

2.4.7 Dams and Impoundments

NCDOT discourages the location of roadways on dams due to the increase in potential for long term maintenance and replacement cost. In those instances where a defined advantage may be gained or a substantial savings in funds may be realized, the use of a dam for a roadway may be considered.

Where it is determined that a dam will be utilized as a roadway the following criteria must be met:

- It must have approval certification from NCDEQ (formerly NCDENR) pursuant to the State Dam Safety Law of 1967 (G.S. 143-215.23-37), when applicable;
- All pertinent data regarding the design of the embankment and impoundment structure must be presented to NCDOT for review;
- Top section of the dam must be equal to the approach roadway section width (shoulder to shoulder) plus a minimum of four feet;
- At a minimum, guardrail will be required on the impoundment side of the roadway;
- The spillway will be designed to provide a minimum freeboard at the roadway shoulder of two feet for a 50-year impoundment level;
- A means of draining the lake completely will be provided.

NCDOT's design acceptance or approval is limited to the use of the dam as a roadway only. It is in no way intended as approval of the embankment as an impoundment structure.

When a dam that also serves as a section of roadway is accepted, responsibility incurred by NCDOT is limited to maintenance of the roadway for highway purposes from shoulder to shoulder only. Responsibility for the impoundment, any damage that may result therefrom, and maintenance of the embankment or appurtenances as may be required to preserve its integrity as an impoundment structure shall remain with the owner of the impoundment. Any maintenance work will be subject to the provisions of G.S. 136-93.

Impoundment of water on highway rights-of-way may be allowed under the following criteria:

- impoundment does not adversely affect the rights-of-way for highway purposes



- adjustments as required (e.g., flattening slopes, rip rap slope protection, structure modifications, etc.) shall be the responsibility of the encroaching party
- provision shall be made for draining the impoundment to facilitate highway maintenance.

2.4.8 Subdivision Streets

Responsibility for the drainage system, discharge pattern and outlet locations to maintain them as they exist at the time of acceptance and is limited to the rights-of-way whenever roads and streets that have been built by others are accepted into the State Highway System for maintenance. In general, stormwater treatment facilities should be located outside of the dedicated rights-of-way.

Information on design, review and approval requirements is provided in the NCDOT publication [Subdivision Roads Minimum Construction Standards](#) (NCDOT, rev 2020).

When accepting streets for maintenance, where drainage review is required by Hydraulics Unit, the following information should be furnished for the review:

- street layout and grades, and if applicable, include proposed catch basins, manholes, stormwater treatment facilities, etc. along with grades (top and invert elevations) of the storm drain system
- typical section
- contour map (if available)
- pipe sizes and grades
- drainage areas at each pipe or inlet
- inlet computations showing gutter spread and bypass for curb and gutter systems
- proposed easements
- vicinity map

This information should be submitted prior to the beginning of construction of the subdivision to enable any recommended changes to be incorporated into the original construction, rather than having to make post-construction adjustments.

Where storm drain systems are used, the minimum design for the collector system should be for the 10-year storm frequency. For cross-drainage, design for the appropriate storm frequency for the functional classification of the highway facility (usually 25-year or 50-year) should be achieved.

Where roads and streets built by others now exist on the system, NCDOT's responsibility for the drainage system installed by the developer does not extend beyond the right-of-way or easement limits accepted by NCDOT. The acceptance of the streets onto the State Highway System does not include drainage easements outside the right-of-way, unless specifically stated that those easements so designated by NCDOT are included in the acceptance.



Requests for additions to the system that arise by roads and streets built by others shall not be granted until the drainage installations have been inspected and approved by a representative of NCDOT. The representative shall be the Division Engineer or appointed delegate. A Hydraulics Unit review is available upon request if desired or if special treatment is needed. If structures other than pipe installations are included, they shall be approved by the State Hydraulics Engineer.

2.4.9 Adjustments to Pipe Culverts

No alteration, extension nor addition of appurtenance to any pipe culvert shall be allowed on highway right-of-way without the written consent of the Division Engineer or his or her authorized representative.

All requests for alteration, extension, or addition of appurtenance to any pipe culvert shall be made in writing to the Division Engineer. Prints shall be furnished and will include the following:

- location and detail of the proposed work
- arrows indicating the direction of flow
- approximate acreage drained by the pipe
- size and type of the existing pipe

The type of construction must be shown whenever appurtenances are involved. The approximate depth from inlet rim to invert shall be shown when catch basins or drop inlets are proposed. Where only minor drainage alterations are involved, the Division Engineer will have authority to approve the encroachment. If other than minor drainage alterations are involved, the Division Engineer shall provide a drawing and recommendations to the Hydraulics Unit for review and approval.

Upon approval by the State Hydraulics Engineer, the request shall be returned to the Division Engineer for preparation and execution of the Encroachment Contract. Any request for alteration to pipe culverts may be submitted to the State Hydraulics Engineer if the Division Engineer deems it appropriate.

2.4.10 Adjustments to Box Culverts

No alterations of, nor additions to, any box culvert on the highway system shall be allowed without written permission from the State Hydraulics Engineer.

All requests for alteration of, or additions to, box culverts shall be made in writing to the Division Engineer. Prints shall be furnished showing in detail the location and nature of the proposed work. The prints shall show sufficient detail such that they may be used as construction drawings. The proposed alteration shall be accomplished within the parameters of good engineering construction and hydraulic design. The Division Engineer shall forward one of these drawings to the State Hydraulics Engineer, with his or her recommendations. After any required revisions and upon approval of the plans by



the State Hydraulics Engineer, the request shall be returned to the Division Engineer for preparation and execution of the Encroachment Contract.

2.4.11 Highway Drainage within the Railroad Right-of-Way

When a highway project involves drainage work at a railroad crossing within or adjacent to a railroad right-of-way, every effort should be made to avoid adverse impacts to the railroad, its drainage facilities, and the right-of-way. If the impacts to a railroad are unavoidable, any activity within the railroad right-of-way must be coordinated with the owner of the railroad. Resources within NCDOT which may be consulted regarding railroad coordination include the Rail Division and the local Highway Division offices.

CSX Transportation and Norfolk Southern Corporation, two railroad companies, provide specific guidance regarding their requirements for activities involving culverts and pipelines within their rights-of-way. This guidance is available online for viewing and downloading (Norfolk Southern Corporation, 2015), (CSX Transportation, 2018). For new highway bridges over railroads, deck drains should not discharge directly over the railroad tracks.

2.4.12 Stormwater BMP Facilities within NCDOT Right-of-Way

The following must be observed with respect to stormwater Best Management Practices (BMP) facilities within NCDOT rights-of-way:

- No private stormwater BMP facilities are allowed within NCDOT rights-of-way.
- No private stormwater pipes or other drainage conveyances are allowed to connect to NCDOT BMP facilities.
- Encroachments that impact NCDOT non-swale BMP facilities should be considered on a case-by-case basis to ensure compliance with applicable regulations and permits (e.g., 404/401). Any authorized impacts to existing non-swale BMP facilities should be appropriately accounted for in NCDOT's Stormwater Controls Management System (SCMS).

2.4.13 Emergency Replacement of Drainage Structures

Emergency replacements requiring federal reimbursement should follow the protocol below:

- Recommendations should follow guidance set by the NCDOT Guidelines for Drainage Studies and Hydraulic Design [Chapters 8](#) and [9](#).
- When a structure is located on a FEMA regulatory stream, NCDOT coordinates with FMP as defined in [Chapter 15](#)
- For reinforced concrete box culverts and bridges, NCDOT submits the appropriate Bridge or Culvert Design Documentation to State Maintenance Office.



- For culverts (excluding RCBC) NCDOT submits a Hydrologic and Hydraulic (H&H) to State Maintenance Office. Information on the report requirements is provided in the [H&H Report Guide for Federal Reimbursement](#)

Design and estimates should be submitted to the Division for Federal reimbursement documentation.



2.5 References

- AASHTO. (2007). *Highway Drainage Guidelines, Fourth Edition*. Washington DC: American Association of State Highway and Transportation Officials.
- AASHTO. (2014). *Drainage Manual. Technical Committee on Hydrology and Hydraulics*. Washington DC: Highway Subcommittee on Design, American Association of State Highway and Transportation Officials.
- Cooper, G. R. (2018, October 29). *North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy*. Retrieved November 2021, from North Carolina Executive Order 80: <https://governor.nc.gov/media/967/open>
- CSX Transportation. (2018, June 5). *CSX Transportation Design & Construction Standard Specifications – Pipeline Occupancies*. (Office of Chief Engineer – Design (n.d.) Construction, CSX Transportation) Retrieved November 2021, from <https://www.csx.com/index.cfm/library/files/customers/property-real-estate/permitting/pipeline-design-construction-specifications/>
- Federal Register. (1977, May). *Floodplain Management, Executive Order 11988*. Retrieved November 2021, from 42 FR 26971, 3 CFR, 1977 Comp. p. 117: <https://www.archives.gov/federal-register/codification/executive-order/11988.html>
- Federal Register. (2013). *Preparing the United States for the Impacts of Climate Change*. Retrieved November 2021, from Executive Order 13653, 78 FR 66819: <https://www.federalregister.gov/documents/2013/11/06/2013-26785/preparing-the-united-states-for-the-impacts-of-climate-change>
- Federal Register. (2015). *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*. Retrieved November 2021, from Executive Order 13690, Federal Register, 80 FR 6425: <https://www.federalregister.gov/documents/2015/02/04/2015-02379/establishing-a-federal-flood-risk-management-standard-and-a-process-for-further-soliciting-and>
- FEMA. (1997). *The National Flood Insurance Act of 1968, as Amended, and The Flood Disaster Protection Act of 1973, as Amended, 42 U.S.C. 4001 et seq.* Washington DC: Federal Emergency Management Agency, Department of Homeland Security.
- FEMA. (2015). *Hazard Mitigation Assistance Guidance; Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program*. Washington DC: Federal Emergency Management Agency, U.S. Department of Homeland Security.
- FEMA. (2016, June 22). *Emergency Management and Assistance, Subchapter B - Insurance and Hazard Mitigation; Title 44, Code of Federal Regulations*.



Retrieved November 2021, from <https://www.govinfo.gov/content/pkg/CFR-2013-title44-vol1/pdf/CFR-2013-title44-vol1.pdf>

FHWA. (1969). *Federal Aid Policy Guide, Location and Hydraulic Design of Encroachments on Flood Plains, Title 23 Code of Federal Regulations (CFR) 650, Subpart A*. Washington DC: Federal Highway Administration, U.S. Department of Transportation.

FHWA. (1992). *Additional Guidance on 23 CFR 650A*. Retrieved November 2021, from Note: Formerly referred to as FHWA-FEMA MOU June 1982 and NS23 CFR 650A. :
<http://www.fhwa.dot.gov/engineering/hydraulics/policymemo/0650asu1.cfm>

Martin, G. J. (1990). *North Carolina Executive Order 123 Uniform Floodplain Management Policy*. Raleigh, NC.

NCDEQ. (2021). *CAMA Handbook for Development*. Retrieved November 2021, from NC Environmental Quality, Coastal Management:
<http://swpermits.nc.gov/web/cm/cama-handbook-for-development>

NCDEQ. (2021, November). *Environmental Management Commission*. Retrieved November 2021, from NC Environmental Quality, Divisions, Water Resources:
<http://deq.nc.gov/about/divisions/water-resources/water-resources-commissions/environmental-management-commission>

NCDEQ. (2021, November). *Riparian Buffers Protection Program*. Retrieved November 2021, from NC Environmental Quality, Divisions, Water Resources:
<https://deq.nc.gov/about/divisions/water-resources/water-quality-permitting/401-buffer-authorization/riparian-buffer-protection-program>

NCDEQ. (2021, November). *Water Supply Watershed Protection Program*. Retrieved November 2021, from NC Environmental Quality, Divisions, Water Resources:
<http://deq.nc.gov/about/divisions/energy-mineral-land-resources/water-supply-watershed-protection-program>

NCDEQ. (n.d.). *State Environmental Policy Act (SEPA)*. (NC Environmental Quality, Permits & Rules, North Carolina Department of Environmental Quality) Retrieved November 2021, from <https://deq.nc.gov/permits-rules/state-environmental-policy-act-sepa>

NCDOT. (2003, July). *Policy on Street and Driveway Access to North Carolina Highways*. (North Carolina Department of Transportation) Retrieved November 2021, from [https://connect.ncdot.gov/resources/safety/Tepp/TEPPL All Documents Library/Policy on Access Manual.pdf](https://connect.ncdot.gov/resources/safety/Tepp/TEPPL%20All%20Documents%20Library/Policy%20on%20Access%20Manual.pdf)

NCDOT. (2008 and as amended). *NCDOT - NCFMP Memorandum of Agreement*.
<https://connect.ncdot.gov/resources/hydro/FEMA%20and%20Interagency%20De>



sign/MOA_mod_20160812_(AID_6686).pdf: North Carolina Department of Transportation and North Carolina Floodplain Mapping Program.

NCDOT. (2012). *Memorandum of Understanding – Section 404 of the Clean Water Act and National Environmental Policy Act – Integration Process for Surface Transportation Projects in North Carolina (Rev. 5/16/2012)*. Retrieved November 2021, from [https://connect.ncdot.gov/resources/Environmental/Compliance Guides and Procedures/Memorandum of Understanding.pdf](https://connect.ncdot.gov/resources/Environmental/Compliance/Guides%20and%20Procedures/Memorandum%20of%20Understanding.pdf)

NCDOT. (2021, November). *Merger Process Guide*. Retrieved November 2021, from Connect NCDOT - Business Partner Resources: <https://connect.ncdot.gov/resources/environmental/lists/merger%20process%20guide/allitems.aspx>

NCDOT. (2021, November 1). *Roadway Design Manual*. (North Carolina Department of Transportation) Retrieved November 2021, from <https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Roadway%20Design%20Manual%20Rewrite%20Release%202011-1-2021.pdf>

NCDOT. (rev 2020, July). *Subdivision Roads Minimum Construction Standards*. Retrieved November 2021, from <https://connect.ncdot.gov/resources/Asset-Management/StateMaintOpsDocs/January%202010%20Subdivision%20Manual%20-%20Revised%20July%202020.pdf>

Norfolk Southern Corporation. (2015, August 1). *Public Projects Manual - For Projects Which May Impact Norfolk Southern Railway Company*. Retrieved November 2021, from http://shrp2.transportation.org/documents/R16_Innovation_Library/Norfolk_Southern/Public_Projects_Manual_for_Projects_That_May_Impact_Norfolk_Southern_Railway.pdf

Obama, P. B.-E. (2013, June). *The President's Climate Action Plan*. Retrieved November 2021, from <https://obamawhitehouse.archives.gov/sites/default/files/image/president27sclimateactionplan.pdf>

U.S Water Resources Council. (1978). *Floodplain Management Guidelines for Implementing Executive Order 11988*. Title 43 Federal Register (FR) 6030.

U.S. Code. (2011). *Federal Water Pollution Control Act, Title 33 U.S. Code, Sec. 1251 et seq., 1987 ed*. Retrieved November 2021, from <https://www.govinfo.gov/content/pkg/USCODE-2011-title33/pdf/USCODE-2011-title33-chap26.pdf>



2.6 Additional Documentation

[H&H Report Guide for Federal Reimbursement](#)